What is Claimed is:

1. A transmitting circuit apparatus comprising:

a frequency modulator that performs frequency modulation of a carrier wave with frequency modulation data and outputs the frequency-modulated carrier wave;

a sigma-delta modulator which performs sigma delta modulation of amplitude modulation data; and

an amplitude modulator that performs amplitude modulation of the frequency-modulated carrier wave with an output signal of the sigma-delta modulator and outputs the amplitude-modulated carrier wave.

2. The transmitting circuit apparatus according to claim 1, wherein the amplitude modulation data has multiple digital values, and

wherein the sigma-delta modulator modulates the amplitude modulation data to amplitude data having binary digital values.

3. The transmitting circuit apparatus according to claim 1, wherein the sigma-delta modulator is at least a second-order or higher-order sigma-delta modulator.

4. The transmitting circuit apparatus according to claim 1, comprising a band pass filter which reduces an unnecessary signal out of a transmitted frequency band of an output signal of the amplitude modulator and outputs the output signal.

5. The transmitting circuit apparatus according to claim 1, wherein the amplitude modulator has a power amplifier and performs amplitude modulation by controlling a power supply of the power amplifier on the basis of an output signal of the sigma-delta modulator.

6. The transmitting circuit apparatus according to claim 1, wherein a class B or class C power amplifier is provided in an output stage of the amplitude modulator.

7. The transmitting circuit apparatus according to claim 1, wherein the frequency modulator has a phase-locked oscillator, which includes at least a variable frequency divider, and a second sigma-delta modulator, wherein the second sigma-delta modulator outputs a value, which is obtained by performing second-order or higher-order sigma-delta modulation of data which is obtained by adding the frequency modulation data to carrier frequency data, as a division number of the variable frequency divider, and

wherein the frequency-modulated carrier wave is outputted from the phase-locked oscillator.

8. The transmitting circuit apparatus according to claim 1, wherein the frequency modulator has a phase comparator, a loop filter, a voltage-controlled oscillator, a mixer, and an IF modulator,

wherein the IF modulator outputs a modulated wave signal at an intermediate frequency that is given frequency modulation with the frequency modulation data,

wherein the mixer performs frequency conversion of an output signal of the voltage-controlled oscillator to an intermediate frequency with a channel selection signal,

wherein the phase comparator performs phase comparison of the frequency-converted signal to a modulated wave signal at the intermediate frequency,

wherein the loop filter reduces an unnecessary signal from the phase-compared signal, and

wherein the voltage-controlled oscillator outputs the frequency-modulated carrier wave by its oscillation frequency being controlled by the signal where the unnecessary signal is reduced.

9. The transmitting circuit apparatus according to claim 1, comprising:

a first E/O converter that converts the frequency-modulated carrier wave from an electric signal into an optical signal;

a first O/E converter that is connected to the first E/O converter via an optical fiber and converts an optical signal, which is converted by the first E/O converter, into an electric signal;

a second E/O converter that converts an output signal of the sigma-delta modulator into an optical signal whose wavelength is different from that of an output of the first E/O converter;

a second O/E converter that is connected to the second E/O converter via the optical fiber and converts an optical signal, which is converted by the second E/O converter, into an electric signal,

wherein an output signal of the second E/O converter is synthesized with an output signal of the first E/O converter, and is branched after being transmitted via the optical fiber to be converted into an electric signal from the optical signal by the second O/E converter, and

wherein the amplitude modulator performs amplitude modulation of an output signal of the first O/E converter with an output signal of the second O/E converter.

10. The transmitting circuit apparatus according to claim 1, comprising:

an E/O converter which converts a signal, which is obtained by synthesizing a carrier wave, which is given the frequency modulation by the frequency modulator, and amplitude data which has digital values which are outputted from the sigma-delta modulator, from an electric signal into an optical signal; and

an O/E converter which is connected to the E/O converter via an optical fiber and converts a converted signal from an optical signal into an electric signal, wherein a signal converted by the O/E converter is divided into the frequency-modulated carrier wave and the amplitude data by a filter, and

wherein the amplitude modulator performs amplitude modulation of the frequency-modulated carrier wave, which is separated, with the amplitude data that is separated.

11. The transmitting circuit apparatus according to claim 1, wherein the sigma-delta modulator has:

an n-th integrator generating a signal obtained by performing n-th integration of the amplitude modulation data,

a quantizer which quantizes the n-th-integrated signal into a digital value, and

a feedback circuit which feeds back the quantized value to an input value of the sigma-delta modulator,

wherein the quantized digital value becomes an output of the sigma-delta modulator, and

wherein the fed-back value is added to an input value of the sigma-delta modulator and is inputted into the n-th integrator.

12. The transmitting circuit apparatus according to claim 1, wherein the sigma-delta modulator has a plurality of

low-order sigma-delta modulators that is connected in multiple stages, and

wherein outputs of the plurality of low-order sigma-delta modulators are connected to a differentiator including configuration expressed by $(1-z^{-1})^{m}$ in z-transform for a order m until the preceding stage respectively, and are synthesized.